The Claiborne Group and Its Remarkable Fossils

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The following wonderful statement from this pamphlet of the Society of Gaslighting may help to account for the mental obliquities which must have contributed to the fallacious reasoning and untenable conclusions found therein: "A glass globe exhausted of air, under constant pressure and temperature, can be filled with the vapor of water, and there is still room for the globe full of alcohol vapor, and then there is still room for the globe full of ether vapor—and we might go still further." We might, in all humility, inquire what the gas analysts are to do, now that this new law of nature, subverting all their processes, has been discovered by the Society of Gaslighting?

A subsequent paper will be submitted on the relations of fuel-gas and the Strong system to *illuminating gas*, and to the closely related Lowe system of making the latter, in which facts and statistics of great public interest, now in the course of collection and preparation, will be brought forward.

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THE CLAIBORNE GROUP AND ITS REMARKABLE FOSSILS.

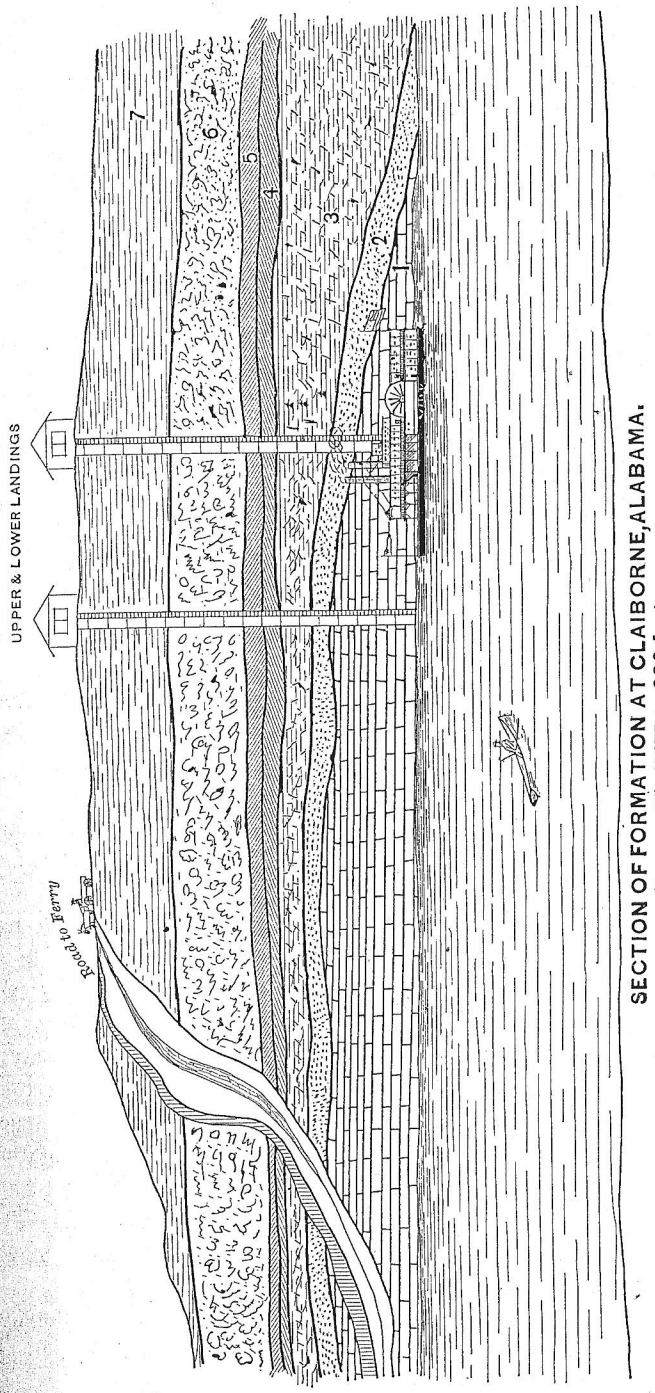
BY PROFESSOR P. H. MELL, JR., AUBURN, ALABAMA.

The little village, from which this formation receives its name, is situated on a bluff of the Alabama River, 175 feet above water level. This bluff is a portion of high table land that begins in the western portion of Choctaw and extends through Clarke and Monroe counties. We find points on this ridge more than 100 feet higher than Tuscaloosa, and nearly as high as the Tennessee River at Tuscumbia. Through this the Alabama River cuts its way, exposing a beautiful cross-section of the strata, of which the accompanying sketch may give some idea.

The fossils are found about 75 feet below the surface and 100 feet above the level of the river. There are seven distinct strata.

1. The lowest, extending from the water's edge up the bluff 80 feet, is a soft calcareous rock containing about 15 per cent. of carbonate of lime, with occasional specks of mica. In this a few *Ostrea*, *Turritellæ*, and *Flustræ* were found, but so friable as to fall to pieces when handled.

2. Next comes a stratum varying from 2 to 8 feet, consisting of



SECTION OF FORMATION AT CLAIBORNE, ALABAMA.
Bluff 175 to 200 feet.

a more compact calcareous rock containing about 30 per cent. of carbonate of lime. In this were found the fine specimens of *Ostrea* accompanying this paper. On close examination numerous grains of greensand were detected scattered through the mass.

3. Above this last is a stratum, the thickest part of which is over 30 feet, narrowing at places to less than 4 feet. From this the largest proportion of the fossils were obtained. It is exceedingly rich in animal remains, containing more than 250 distinct species of shells alone, while a variety of bones, shark's teeth, etc., have also been found in great abundance. "The bed is composed of loose quartzose, brownish sand, the grains of which are small and angular. The most perfect specimens can, therefore, be removed with ease in a perfect state." The fossils from this stratum are most wonderful on account of their perfect preservation of form and color. One would naturally suppose that they were gathered from the present seashore. The animal seems to have just left them.

4. Above this layer is a thin friable rock, easily separating into irregular pieces, composed of light and dark greensand. The grains of sand do not present angles, but are rounded and cemented by carbonate of lime.

5. A thin layer of sand and shells which are badly decomposed.

6. The next in order is a stratum of rotten limestone about 45 feet thick.

7. On top of this is deposited the diluvium strata.

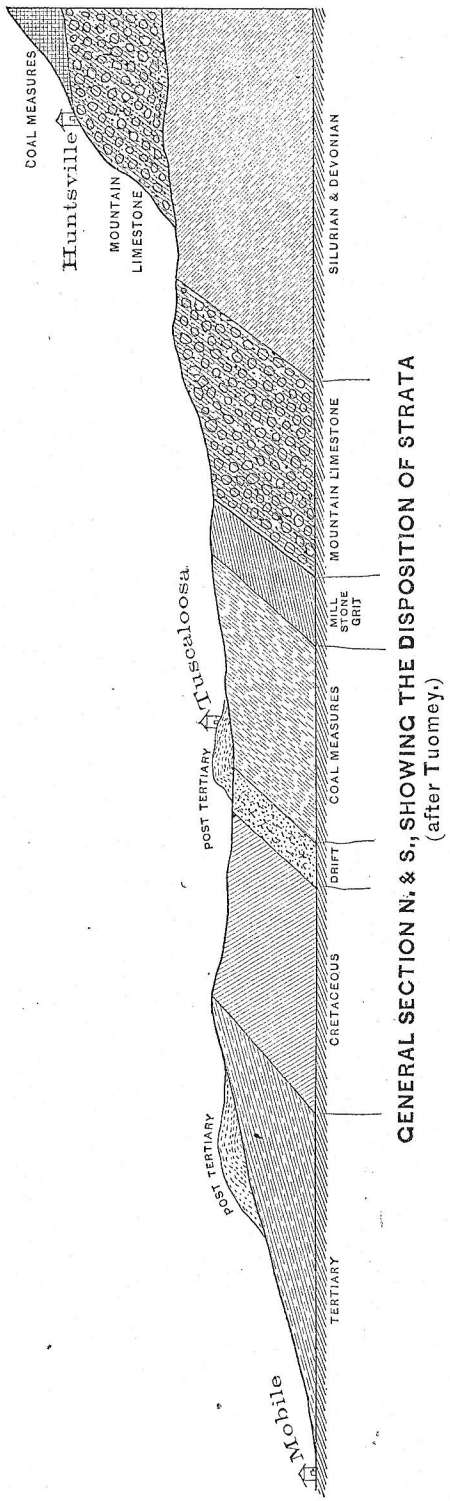
In connection with this formation at Claiborne, but a little farther south, is an extensive deposit of the remains of the *Zeuglodon cetoides*, the whale of the tertiary seas. These fossils are found in vast numbers around Gainestown, Clarke County. The deposit trends in a southwest direction. The vertebræ, particularly, are in such vast quantities that some farmers use them for building fences. They are exceedingly large, some measuring fully 12 inches in diameter and 15 to 18 inches in length. I have one now in my museum of these dimensions. The specimen I send for the collection for the German Geological Institute is rather smaller than the majority found at this locality, but it gives, however, a fair representation of the character of the remains. Lyell says that the vertebral column of one of these huge animals has been found in place nearly 70 feet long, but there is every reason to believe that some of these monsters must have attained the enormous length of 100 feet.

These fossils seem to belong to but one locality in the State, or at least the present developments have exposed no other deposit. This

is somewhat singular when we consider that the Tertiary covers such a wide area of country. I have but one explanation to give. It is a well-known fact that the recent formations were deposited by the waters of the then existing ocean, and also by the great streams flowing across the carboniferous, silurian, and cretaceous countries. The irregularity of this deposition at certain points is evidently the result of currents and eddies in this great expanse of water. Such being the case other beds of fossils similar to the above may be found by cutting through the upper stratifications. There must have been depressions and elevations on the bottom of the then existing ocean, as the present contour of the land seems to indicate; and the present outcrop of *Zeuglodon* fossils may have been an elevated place in the sea.

This portion of Alabama is of special interest to the geologist as presenting features not to be found in any other portion of the world. Passing for the first time from the tertiary formation of Georgia to that of Alabama, one would be struck by the marked contrast between the two sections. In the first State the country is comparatively level and regular in form, while in the latter the surface is broken and covered by innumerable hills and ridges, some of which are quite lofty. The Claiborne ridge is a good illustration of this feature of the country. A reason for this great difference between the two sections of the same formation would be quite difficult to give unless a thorough knowledge is first obtained of those older deposits covering the northern portion of the State. By a glance at the geological map of Georgia it will be noticed that the Tertiary borders on the Drift, a narrow strip that separates it from the metamorphic region. In Alabama, however, a wide belt of Cretaceous juts up between the Drift and Tertiary, as is seen in the accompanying sketch.

The Cretaceous first makes its appearance on Georgia soil not far east of the city of Columbus. It sweeps around towards Selma, Alabama, beyond which point it takes a northwest course into Mississippi. Now it is my opinion the Tertiary of Alabama was almost, if not entirely, formed from the Cretaceous, and the building agent was *ice*. I have been very much strengthened in this view after carefully studying the other formations of the State. Just prior to the time that the Tertiary was lifted up above the waters the geographical features of Alabama were very favorable for the transportation of ice, and every indication seem to point to the fact that the present Coosa and Warrior rivers were the great channels



GENERAL SECTION N. & S., SHOWING THE DISPOSITION OF STRATA
(after Tuomey.)

through which the glaciers from the north reached the State. Scattered over the Cretaceous are certain isolated points elevated considerably above the present level. Capping these islands, as it were, is a compact sandstone, underlying which are the cretaceous marls and limestones. This sandstone is found only on these elevated points, and associated with it are quantities of water-worn pebbles. The remainder of the Cretaceous is in the form of a huge trough, the portion joining the Tertiary being much higher than the central part.

Now these high points, all containing the same stratum of sandstone and water-worn pebbles, seem to indicate that the Cretaceous must have been at some past age entirely overlaid by this sandstone. What then has placed it in its present peculiar form? The force, above mentioned, must have been a powerful agent in this transformation. While this grinding and wearing away of the Cretaceous was taking place the Tertiary was still covered by water, but not to a great depth. As this material was thrown into the sea it was caught up by the many currents that existed and spread over the wide expanse of bottom.

I am also of the opinion that several of the strata displayed at Claiborne, which contain but few fossils, must have been deposited in a short space of time by the great influx of ice-bearing sediment, while on the other hand, the stratification containing the vast numbers of fossils must have been deposited by slow and quiet means, a great time elapsing before the deposition was completed. The fossils were not brought in by a great and violent current, but were placed there by the animals themselves after living the time allotted them by nature. This opinion is confirmed when we notice how well preserved is their delicate form and color. I have found but the smallest proportion that are anyway water-worn.

Now for a practical deduction from the facts and surmises given above. Although I have made but one trip into the Tertiary of Alabama, I have, nevertheless, been forcibly struck with the immense accumulation of animal remains—bones of huge sea monsters and teeth of enormous sharks, all mingled together in a heterogeneous mass, and spread over the entire southwestern part of the State. Scattered among these remains are small rounded grains of greensand, similar to that variety in New Jersey that has been of such great benefit to the farmer in the production of potash and phosphoric acid. Is it not reasonable to suppose that where two such associates, as bones yielding phosphoric acid and greensand

producing potash are found, extensive phosphate beds, resembling those at Charleston, S. C., may at some future day be discovered if diligent search be made? At least I am inclined to predict that a few years hence Alabama will be carrying on extensive mining operations for this valuable fertilizer.

With a few directions as to the best route to Claiborne I will close. If it is desired to study the cross-sections of both the Cretaceous and Tertiary formations the best plan will be to go directly to Montgomery, Alabama, and board the river steamer that leaves that city about three times a week. It will be necessary, however, for the tourist to be provided with an extra amount of patience before engaging a berth on one of these vessels, especially during the cotton-trading season. The speed is exceedingly slow,—not more than ten miles per hour,—and the stoppages are frequent, wherever a bale of cotton can be obtained. But, on the other hand, the accommodations are very good, and the officials particularly polite and attentive. Such a trip as this would be of interest to one who loves to study human nature in all its varied forms, for certainly the types are of many kinds. It generally takes about two days and two nights to make the trip from Montgomery to Claiborne, the distance being 382 miles. The fare between these two points is $6.00.

If, however, there is but limited time in which to make the trip, the advisable plan will be to pass through Montgomery and go immediately to Mobile, *via* the Montgomery and Mobile Railroad, and take the boat at this last place for Claiborne. The distance from Mobile to Claiborne is only 100 miles, and the fare about $1.50. Board can be obtained in Claiborne at the rate of $1.00 per day, backed up by good country hospitality. Of course the tourist will not fail to avail himself of the opportunity for visiting the deposit of *Zeuglodon cetoides* fossils, and a sojourn of a day or two in the neighborhood of Gainestown, Clarke County, will be required; after which he may continue his trip towards Claiborne by the next steamer.

The following is a list of the fossils found at Claiborne. Those in italics I have sent with this paper as a contribution to the collection for the German Geological Institute. I hope to be able to make the collection complete in the course of two or three months. Where no name is given Lea is supposed to be the authority.

Lunulits Bouei.
" *Duclosii.*
Orbitolites interstitia.
" discoidea.
Turbinolia Macluriі.
" *Stokesii.*
" *Goldfussii.*
" *nana.*

Turbinolia pharetra.
" *Caulifera* (*Con.*).
Siliquaria Claibornensis.
Dentalium alternatum.
" *turritum.*
" biformis (*T*).
" thalloides (*Con.*).
Spirorbis tubanella.
Serpula ornata.
Teredo simplex.
Solecurtus Blainvillii.
Anatina Claibornensis.
Mactra dentata.
" Grayi.
" pygmæa.
Corbula Alabamiensis.
" Murchisonii.
" *gibbosa.*
" *compressa.*
" oniscus (?).
" nassuta (?).
Byssomia petricoloides.
Egeria rotunda.
" *inflata.*
" *nitens.*
" *triangulata.*
" *Bucklandii.*
" *subtrigonia.*
" *venereformis.*
" *ovalis.*
Egeria plana.
" *nana.*
Lucina compressa.
" rotunda.
" cornuta.
" *impressa.*
" papyracea.
" *lunata.*
" carinifera (*Con.*).
" pandata (*Con.*).
Gratelupia Monlinsii.
Astarte recurva.
" *Nicklinsii.*
" *sulcata.*
" parva.
" minor.
" *minutissima.*
" Tellinoides (*Con.*).
Cytherea globosa.
" *comis.*
" *Hydii.*
" *subcrassa.*
Cytherea trigoniata.
" *minima.*
" perovata (*Con*).
" Poulsoni (*Con.*).
" Nuttalli (*Con*).
" Sayana (*Con.*).
" albarea (*Say.*).
" æquorea (?).
" eversa (*Con.*).
Venericardia transversa.
" *Sillimani.*
" *rotunda.*
" *parva.*
" *planicosta* (*Lam.*).
Hippagus isocardioides.
Myoparo costatus.
Arca rhomboidella.
Pectunculus Broderipii.
" *minor.*
" *deltoideus.*
" *ellipsis.*
" *obliqua.*
" stamineus (*Con.*).
" sp. (?).
Nucula Sedgewickii.
" *ovula.*
" *pectunculoris.*
" *Brogniarti.*
" media.
" pulcherrima.
" *plicata.*
" magna.
" carinifera.
" plana.
" semen.
" magnifica (*Con.*).
Avicula Claibornensis.
Pecten Deshaysii.
" Lyelli.
Plicatula Mantellii.
Ostrea Semilunata.
" *divaricata.*
" *Alabamiensis.*
" lingua canis.
" pincerna.
" emarginata (*T.*).
" compressa-rostrea (*Say*).
Fissurella Claibornensis.
Hipponix pygmæa.
Infundibulum trochiformis.
Crepidula cornu-arietes.
" lirata (*Con.*).

Bulla St. Hilairii.
" Dekayi.
Pasithea secale.
" *notata.*
" lugubris.
" aciculata.
" striata.
" sulcata.
" *umbilicata.*
" guttula.
" Claibornensis.
Natica striata.
" parva.
" minor.
" *minima.*
" *gibbosa.*
" *semilunata.*
" magno-umbilicata.
" *mamma.*
Acteon punctatus.
" *lineatus.*
" *elevatus.*
" melanellus.
" striatus.
" pygmæus.
pomilius (*Con.*).
Scalaria planulata.
" carinata.
" quinquefasciata.
Delphinula plana.
Delphinula depressa.
Solarium bilineatum.
" *Henrici.*
" *ornatum.*
" *elegans.*
" *cancellatum.*
" granulatum.
" elaboratum (*Con.*).
" alveatum (*Con.*).
Orbis rotella.
Planaria nitens.
Turbo naticoides.
" *nitens.*
" lineata.
Tuba striata.
" alternata.
" sulcata.
Turritella carinata.
" *lineata.*
" *imbricata* (*Lam.*).
" mortoni (*Con.*).
" obruta (*Con.*).
Turritella Cathedralis (*Brongn*).
Cerithium striatum.
Pleurotoma cælata.
" *Lonsdalii.*
" Sayi.
" monilifera.
" Baumontii.
" *Desnoyersii.*
" Hæninghausii.
" *rugosa.*
" obliqua.
" Childrenii.
" *Lesueurii.*
" acuti-rostra (*Con.*).
" sp. (?).
Cancellaria Babylonica.
" multiplicata.
" *plicata.*
" sculptura.
" tessellata.
" elevata.
" costata.
" parva.
" gemmata (*Con.*).
Fasciolaria plicata.
" *elevata.*
Fusus pulcher.
" *Mortonii.*
" decussatus.
" *bicarinatus.*
" *venustus.*
" *crebissimus.*
" *magnocostatus.*
" Delabechii.
" *ornatus.*
" acutus.
" Conybearii.
" *nanus.*
" *Fittonii.*
" parvus.
" minor.
" *Taitii.*
" *sp.* (?).
" spiniger (*Con.*).
" salebrosus (*Con.*).
" papillatus (*Con.*).
Pyrula cancellata.
" elegantissima.
" Smithii.
Murex alternata.
Rostellaria Lamarckii.
" Cuvieri.

Rostellaria velata (*Con.*).
" *laqueata* (*Con.*).
" *alveata* (*Con.*).
Monoceros pyruloides.
" *fusiformis.*
" sulcatum.
" *vetustus* (*Con.*).
" armigerus (*Con*).
Buccinum Sowerbii.
Nassa cancellata.
Terebra gracilis.
" costata.
" *venusta.*
Mitra lineata.
" minima.
" *fusoides.*
" Flemingii.
" Humboldtii.
Voluta Defrancii.
" *gracilis.*
" *parva.*
" Vanuxemi.
" *sp.* (?).
" striata.
" *sp.* (?).
" *Parkinsonii.*
" *Cooperii.*
" *Sayana* (*Con.*).
" Tuomeyi (*Con.*).
" *petrosa* (*Con.*).
Marginella anatina.
" columba.
" *Crassilabra.*
" plicata.
" *semen.*
" *ovata.*
" *incurva.*
" biplicata.
" larvata (*Con.*).
Anolax gigantea.
" plicata.

Oliva constricta.
" *gracilis.*
" *Greenoughii.*
" *dubia.*
" *Phillipsii.*
" minima.
" *sp.* (?).
" Alabamiensis (*Con.*).
Montoptygma Alabamiensis.
" *elegans.*
Conus Claibornensis.
Genus (?) *Species* (?)
Genus (?) *Species* (?)
Unknown.
Bone of a fish.
Spine of a fish.
Shark's tooth.
Turbinella pyruloides (*Con.*).
Sigaretus sp. (?).
Pholas Roperiana (*Con.*).
Modiola Ducateli (*Con.*).
Melongena alveata (*Con.*).
Emarginula arata (?).
Crassatella Mississippiensis (*Con.*).
" *alta* (*Con.*).
" *protexta* (*Con.*).
Zeuglodon cetoides.
Corbis lamellosa (?).
Conus sauridens (*Con.*).
Cassis Taitei (*Con.*).
Cardium Vicksburgense (*Con.*).
" diversum (*Con.*).
" Nicoleti (*Con.*).
Cardita plani-costa (*Con.*).
" alti-costa (*Con.*).
" rotunda (*Con.*).
" densata (*Con.*).
Ancillaria subglobosa (*Con.*).
" staminea (*Con.*).
" scampa (*Con.*).